BRANCHING OUT
IPM NEWSLETTER FOR TREES & SHRUBS

Treatment of Ash in New York for the Emerald Ash Borer

Mark Whitmore, Forest Entomologist, Department of Natural Resources, Cornell University

Management of Emerald Ash Borer (EAB) has been evolving at a rapid pace since it was first identified as the cause of widespread ash mortality in the Detroit area in 2002. A benign beetle in its native Eastern Asia, EAB has quickly become one of the most important forest pests ever in North American forests. EAB not only threatens the loss of ash trees as timber, but the most important economic impacts will continue to be faced by government, communities, and individuals responsible for maintaining vulnerable infrastructure and mitigating the public health hazard as well as other impacts (Aukema et al. 2012). In 2002 we knew almost nothing about EAB biology, ecology, or management. We've come a long way since then, developing effective methods to save individual trees but have yet to tackle EAB on a landscape scale. In this article I'll be focusing on management practices that have been developed for treating individual trees in an urban environment.

EAB population behavior

In order to know when to treat it is important to understand a bit about EAB population behavior. One of the biggest problems with EAB is that they can get started and build in an area unnoticed for years. By the time symptoms like crown thinning begin to appear EAB has already had years to spread. When mortality begins to appear in the infestation core you can be assured that EAB is already established in the surrounding area where infested trees are asymptomatic. The problem is that once mortality is detected studies show that in only a few years nearly all the ash in an area will be dead. In a southern Michigan study Dr. Dan Herms (2012) found that it took ten years or more for 30% of the trees to die (Figure 1), but only 4 years after that mortality was nearly 100%.

When considering treatment of individual trees you should not wait until you see crown dieback symptoms. Even though you may

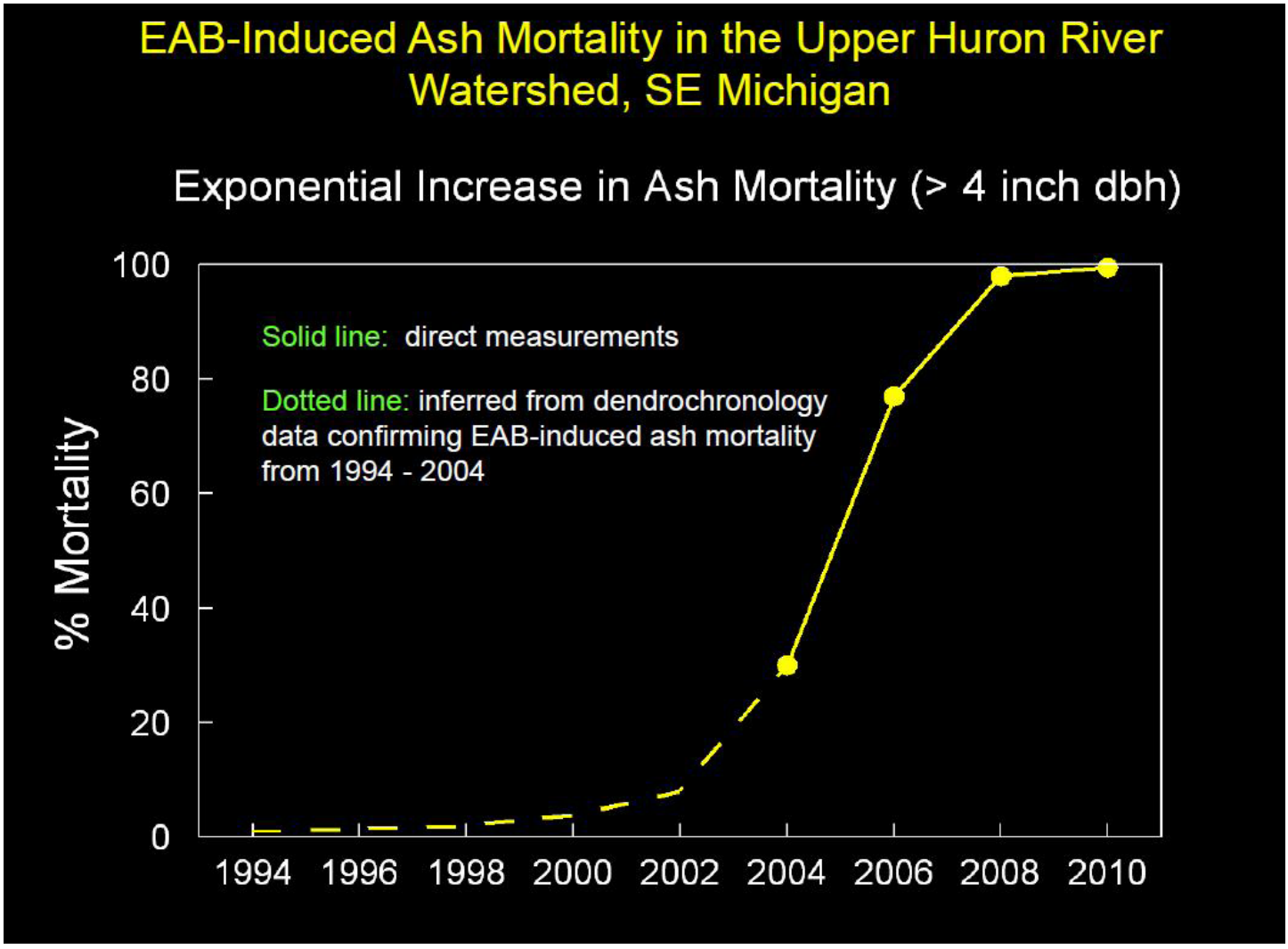

Figure 1. Emerald ash borer-induced ash mortality. Graph courtesy of Dr. Dan Herms, Ohio State University.

not see any symptoms, if you are near an infestation the chances are good that EAB is present in low numbers. When an EAB attacks a tree it will kill the phloem in an area about the size of your hand. The capacity of vascular tissue to function will be compromised with each additional attack. Once crown dieback symptoms are visible there has already been considerable damage to the trees vascular system. This is particularly important with large trees (>20 in. dbh) which might already have a compromised vascular system. The general recommendation is that trees with more than 50% crown decline will likely not respond to treatment. On the other hand, I've seen a younger tree with 50% canopy decline recover nicely, albeit with much attention.

Treatment options

There are many products listed in New York for the control of EAB and a full list can be found at the Cornell Cooperative Extension's Crop and Pest Management Guidelines website (ipmguidelines.org) listed under Trees and Shrubs. However, I'll be considering only the systemic insecticides that have been thoroughly researched for efficacy: imidacloprid, emamectin benzoate, and dinotefuran. For this discussion I am going to primarily draw upon the work of Dr. Deborah McCullough at Michigan State University and Dr. Dan Herms at Ohio State University. However, I have also gleaned some great information in conversations with arborists from the Midwest.

Imidacloprid

There are many formulations of imidacloprid registered for use on EAB. The only product available to homeowners is an imidacloprid soil drench. This product has been shown to work in the early stages of an infestation but its efficacy wanes as the pest pressure increases at the height of an infestation. The most effective imidacloprid products tested are those available only to licensed pesticide applicators. Professional products are available as both soil treatments and injections. So far the efficacy all imidacloprid formulations have been shown to offer only one year of protection. Imidacloprid soil drenches are most effective on larger trees when applied at the 2x rate (2.8g ai/in. DBH). The label for Merit and Xytect was recently changed in NY so that a 2x treatment rate can be used on trees greater than 15 inches DBH. Spring treatments have been shown to be more effective than fall, and the 1x rate only effective with spring application.

Imidacloprid formulations have been shown to offer only one year of protection.

Emamectin benzoate

In a number of studies emamectin benzoate, or TREE-äge, has been demonstrated to be the most effective pesticide for controlling EAB, especially when the pest pressure is high (McCullough et al. 2011). It is injection only and is currently labeled for 2 year efficacy. However, recent unpublished research has demonstrated that in younger trees (<18 in. DBH) it is effective for up to 3 years at 0.4g ai/in. DBH. For larger trees the recommendation is to stick to the 2 year treatment plan, although it is interesting that Dr. Herm's latest work shows that TREE-äge provides two years of control in very large trees (40 to 50 in. DBH) even at the lowest rate (0.1g ai/in. DBH). One of the more intriguing new management ideas has come from Dr. McCullough who has proposed treating only a proportion, say ⅓, of the trees in an area every year so that by the third year all the trees are treated. If you start early enough, before the trees are symptomatic, all the trees would be protected and the yearly cost of treatments would be lower.

Emamectin benzoate has been the most effective pesticide for controlling EAB, especially when the pest pressure is high.

Dinotefuran

Dinotefuran, or Safari, has been proven to be effective with both the basal bark spray and soil injection, but only the basal bark spray is approved for use in New York. As with imidacloprid, its efficacy is limited to only one year. Dinotefuran is the most water soluble of the EAB products available and for this reason has been used by arborists to move quickly into a heavily damaged tree (up to 50% canopy decline) and stop larval feeding. This is especially useful in summer when imidacloprid and emamectin benzoate don't readily move into the tree.

Summary

Evidence is mounting that heavily damaged trees can be saved but it is important to realize they may not show recovery immediately. Earlier work with imidacloprid did not take this lag time into consideration and that is why imidacloprid was initially dismissed as efficacious for EAB.

Evidence is mounting that heavily damaged trees can be saved.

Dr. Herms also recently ran trials where he looked at the effectiveness of three different products in an area of high pest pressure. He found that TREE-äge injection and Xytect (imidacloprid) 2x soil drench are more effective than Pointer injection.

At this point the management of EAB in trees has been shown to be effective but there are questions that we are just beginning to grapple with. What happens after EAB has apparently killed all the trees? The pest pressure will obviously lessen, so can we begin to cut back on treatment frequency and/or concentration? Our thinking is that we will be able cut back on treatments but when and by how much? The answers to these questions will be forthcoming as EAB moves, stay tuned.

Bibliography

Aukema, J.E., McCullough, D.G., Von Holle, B., Liebhold, A.M., Britton, K., and Frankel, S.J., 2010. Historical accumulation of nonindigenous forest pests in the continental United States. BioScience, 60: 886-897.

McCullough, D. G., T. M. Poland, A. C. Anulewicz, P. Lewis, and D. Cappaert. 2011.Evaluation of *Agrilus planipennis* (Coleoptera: Buprestidae) Control Provided by Emamectin Benzoate and Two Neonicotinoid Insecticides, One and Two Seasons After Treatment. J. Econ. Entomol. 104(5): 1599-1612.